

Math 123: Trig Integrals

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Outline

1 Trig Integrals

How do we integrate Trigonometric functions?

Example: $\int \sin(x)dx$ and $\int \cos(x)dx$.

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$$\cos^2(x) + \sin^2(x) = 1$$

and u-substitution

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Example: $\int \cos^5(x)dx$

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Example: $\int \sin^2(x) dx$

For $\int \cos^{\text{even}}(x) dx$ or $\int \sin^{\text{even}}(x) dx$ use

$$\cos^2(x) = \frac{1}{2}(1 + \cos(2x))$$

$$\sin^2(x) = \frac{1}{2}(1 - \cos(2x))$$

possibly multiple times

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Example: $\int \cos^4(x) dx$

How do we integrate Trigonometric functions?

Example: $\int \sin^2(x)\cos^3(x)dx.$

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For $\int \sin^{\text{anything}}(x)\cos^{\text{odd}}(x)dx$ or $\int \cos^{\text{anything}}(x)\sin^{\text{odd}}(x)dx$ use

$$\cos^2(x) + \sin^2(x) = 1$$

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Example: $\int \sin^2(x)\cos^3(x)dx$.

For $\int \sin^{\text{anything}}(x)\cos^{\text{odd}}(x)dx$ or $\int \cos^{\text{anything}}(x)\sin^{\text{odd}}(x)dx$ use

$$\cos^2(x) + \sin^2(x) = 1$$

and u-substitution

Question: What about $\int \sin^{\text{even}}(x)\cos^{\text{even}}(x)dx$

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Example: $\int \tan(x)\sec^4(x)dx.$

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For integrals involving $\tan(x)$ and $\sec(x)$ use

$$1 + \tan^2(x) = \sec^2(x)$$

and u-substitution.

Some Challenges

Example: Find $\int \sec(x) dx$.

Example: Find $\int \sec^3(x) dx$.